

Letters to the Editor.

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The Organisation of Scientific Work in India.

AS NATURE waited for more than a year to criticise the Indian Industrial Commission's Report which was published in October, 1918, it will probably tolerate this additional delay of a few weeks (due to my absence in India) in attempting, on behalf of my colleagues, to demonstrate that the impressions conveyed by the leading article in the issue of February 19, and by the letters which followed in three later issues, bear little resemblance to the Commission's proposals for "the organisation of scientific work in India."

We are well aware out here that the writer of the article borrowed many of his expressions, and that the correspondents who furnished the subsequent applause obtained their impressions of the Industrial Commission's scheme from a memorandum which was privately composed and circulated among a few scientific men in England after the departure of the only two members of the Commission who were at home last year on leave. If I had seen the private memorandum only, I, too, should have added my vote to the others in condemning a scheme apparently designed to tamper with the form of liberty that is essential to scientific research; and I doubt if I should have shown the canny wisdom of a distinguished chemist who, in reply to the author of the memorandum, cautiously commented on "proposals said to have been set forth in the report of the Indian Industrial Commission." That most of your distinguished correspondents had not read the Commission's report itself is obvious enough from their letters, though only one of them frankly says so. One writer, for example, states that "under the centralisation scheme the work of an investigator would depend on the previous sanction of the head of the Service, who would probably not be of any scientific eminence, or might even be without scientific qualification." The one obvious and plainly stated object of the Commission's scheme is to release isolated scientific research workers from control by non-scientific officials, and it is so designed that even the scientific officer suggested for the head of each Service cannot do more than criticise and advise without interfering.

According to the privately circulated memorandum, "two policies are at present in the field: (a) absolute centralisation with the formation of distinct, water-tight, graded departments of science (botany, zoology, chemistry, etc.) being controlled by a separate departmental head." This is intended to represent the policy of the Industrial Commission, and the literal agreement between the statement in the leading article of February 19 and three-quarters of this quotation is as important to notice as the additions made by the writer of the article. Both, like your correspondents, have confused the wholly distinct terms "services" and "departments," which are clearly distinguished in the Commission's report; but the writer of the article has also gratuitously added a statement which neither the Industrial Commission nor any other responsible body here has ever suggested, namely, the placing of "botanists, zoologists, and so on," under the proposed Imperial Department of Industries.

Your correspondents, out of the fullness of their
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successful experience, reproduce many well-worn platitudes on the freedom necessary for research, but they overlook the fact that many young scientific officers are employed for such accessory routine duties as analyses and identifications, which may be dull, but are essential to the operations of agriculture, forestry, and mineral development. They forget, too, that most of the so-called research work of many others is purely descriptive, which is equally essential in a country stocked with raw materials of unknown nature. Unless their work comes to the notice of a senior authority of their own caste, young scientific officers so employed in departments or institutions controlled by non-scientific officials would rarely get a chance of showing their worth or of justifying their desire for research opportunities; unless they are members of some "service," and thus come automatically to the notice of their scientific chief, they must either remain low-paid "hewers of wood" or refuse to renew their agreements and quit.

Then among those who already enjoy opportunities for research there are some who need the support of an independent senior authority in their desire to obtain the necessary freedom and funds from the local authorities in control; and it matters little whether the "constituted authority" be a committee, a board, a hidebound official, or our most senior of scientific councils, which Prof. Soddy regards as the obsolete product of inbreeding, for all have learnt the danger of taking unchecked the average man's estimate of his own worth. There are some, too, among our isolated scientific workers who have not sufficient confidence in themselves to close their inquiries for publication; they need the crystallising influence of a senior worker who has the right to ask them how they are getting on with that piece of research which was in progress last year; there are others who, distracted by the abundance of their ideas and the wealth of available raw material, pass from one inquiry to another without finishing any; there are some who, in their isolation, unwittingly waste time in pursuing lines already more completely developed but not yet published elsewhere. Then there are isolated workers who, for want of a pace-maker, grow weary in well-doing; and, finally, there is the inevitable residue who, through uncontrolled freedom, become charlatans. But although all these well-known species of scientific men are represented in India, I doubt if we have any here who have yet attained such experience and dexterity in the use of "scientific method" as to justify their criticising a report that they have never seen.

Your leading article of February 19, after referring to the research work done in existing institutions of various sorts, asserts that "the present system has proved successful in practice." It would not be fair, nor would you find space, to describe the painfully numerous exceptions; but if the situation must be summed up in only a few words, the following two statements are sufficient: (1) During its tours the Industrial Commission received complaints nearly everywhere of the disabilities that handicap scientific workers under the present "system"; and (2) the most conspicuous success is also the most centralised institution of all, namely, the Geological Survey, which is a Department as well as a Service.

We cannot hope to provide for other scientific workers the amenities now secured by the geologist; he inherits the results of the forethought of a distinguished scientific worker who had also a genius for administration—Dr. Thomas Oldham. But it was the hope of the Industrial Commission to devise a scheme which (taking into account established vested interests, the tendency towards provincial autonomy,

and the transfer of some provincial scientific institutions to the control of popular representatives necessarily anxious for visible results) would retain for scientific workers the security of a central Service, and, so far as their research activities are concerned, the advantages of the support and criticism of a senior officer of their own caste. Our scheme is not an attempt to impose arbitrary control, but a simple response to a general petition from scientific workers for protection and support.

It cannot be applied, however, without suitable modification to fit established interests and institutions. There are, for example, forest botanists who are forest officers first and botanists after; their bond with the Forest Service is closer than with the Botanical Survey, and both should be developed as complementary, not competing, Services. There are agricultural chemists whose community of interests with the rest of the Agricultural Service forms a stronger service link than their affinities to other chemists; they might more appropriately be termed chemical agriculturists, and, having one of their own, they need not form part of the suggested Chemical Service.

To find out whether the general principles suggested by the Commission are applicable at all to each of the major sciences, and, if so, to adjust the scheme to established conditions, requires examination by special committees. One such committee for chemistry under Prof. J. F. Thorpe has just published its report, from which it will be seen that a committee composed of six chemists and one administrative officer, after examination of witnesses and institutions in various parts of India, accepts for chemists the scheme which your correspondents, rashly believing a privately concocted memorandum, label as "servitude undisguised," a "means of encouraging mediocrity," "bureaucratic centralisation," and other epithets.

To those of your readers who do not know the motive of the private memorandum referred to above, the special reasons for delaying the date for its distribution to every member of the Royal Society's Indian Advisory Committee—except myself, its chairman—and the selection of "the solid ground of NATURE" as the *point d'appui*, this "mass attack" on the Industrial Commission's scheme has doubtless all the appearance of spontaneity and honest conviction.

By an official accident, not foreseen by the author of the private memorandum, I have now before me (1) a proposal from a committee of botanists for the enlargement of the Botanical Survey, and (2) the unsought advice of a forest botanist who, through commendable but over-jealous regard for his own institution, submits opinions collected from ingenuous scientific men and the correspondence in NATURE in support of his proposal, not for the expansion, but for the limitation of the Botanical Survey to one cryptogamic botanist and three specialists in medicinal plants. And this in a tropical and semi-tropical country covering 1,750,000 square miles! Fortunately, there is enough evidence available to justify further support for, and the independent maintenance of, both botanical institutions: but the petty jealousies of those who suffer from this form of mental astigmatism scarcely reinforce one's efforts to secure for isolated unorganised workers in other sciences the benefits now enjoyed by the geologist, or to secure for all scientific workers in India the privileges and recognition long ago accorded to engineers, doctors, and the members of the Indian Civil Service.

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Simla, May 5.

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[The leading article to which Sir Thomas Holland refers described the proposals of the Indian Industrial Commission and discussed the policy of centralisation and the creation of graded scientific Services in comparison with the present system under which research is carried on in India. In the correspondence which followed attention was given chiefly to the general principles of "Organisation of Scientific Work," and it was not necessary to be familiar with the Report of the Commission in order to express opinions upon these, or to urge that creative investigators produce their best results when they are given perfect freedom of action. The proposed scientific Services of India may, as regards their aims, be compared with the Industrial Research Associations at home, and are similarly capable of promoting progress in both pure and applied science. But the work carried on at universities and research institutes by men outside official Services has even greater need of financial support, because its value is not so readily understood. This is the aspect of productive research with which we are particularly concerned, and for which we ask full consideration.—ED. NATURE.]

Anti-Gas Fans.

I HAVE read Mrs. Ayrton's letter in NATURE of June 3, after, unfortunately, missing the note in the issue of May 13, as well as the *Times* correspondence referred to. I have no intention of entering into a controversy, polemical or otherwise, with Mrs. Ayrton, but should like to put my views before your readers, as I believe them to be shared generally not only by Headquarters Gas Service officers, but also by regimental soldiers of all ranks, including Gas personnel.

The crux of the matter is this: The problems involved in gas defence after July, 1917, when the enemy commenced using "mustard gas," were of a totally different nature from those which had to be faced before that date. Then, apart from small quantities of the annoying, but otherwise practically innocuous, "tear gas," we had to deal with moderate quantities of lethal gas shell, containing the *volatile* "diphosgene," and, very occasionally, with waves of cloud gas. Under those conditions the gas, except in very cold weather, disappeared quickly (a matter of minutes) from the open, or even from trenches of average depth, but was liable to collect and remain in shelters for hours, or even days. When such shelters had been once cleared they were habitable, as no "gas" remained outside in the neighbourhood to contaminate them further. For this purpose the Ayrton fan was found to be useful, and large numbers were issued as trench stores. Later the more simple, and quite as efficacious, method was introduced of merely lighting a small fire in the shelter, and thus causing a through draught. This was found to be distinctly superior for deep shelters, such as those in the chalk country of the Somme battlefield, and, moreover, was far less fatiguing to the men employed. Working an Ayrton fan, even in the most approved fashion, when wearing a gas-mask on a hot day, is a tiring task.

After the date mentioned we had essentially to deal with a relatively *non-volatile* shell-filling, which produced its well-known effects at concentrations far below those at which the volatile fillings became innocuous, and was used by the enemy in very large quantities. This gave little warning of its presence to the uninitiated, soaked much of the ground and pervaded the whole atmosphere in the shelled area for days afterwards, made great demands on the endurance and discipline of the soldier, and called for quite new measures. This is not the place to discuss these measures, but it is clear that the use of either fire or